

Impact of Social Media Use on Sleep Patterns among Adolescents: A Cross-Sectional Study

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ABSTRACT

OBJECTIVE: To assess the impact of social media use (SMU) on sleep patterns among adolescents.

METHODOLOGY: This analytical cross-sectional study was conducted at the Armed Forces Institute of Mental Health in Rawalpindi from March to September 2024. A total of 380 adolescents aged 10–19 years were selected using a nonprobability consecutive sampling technique after applying inclusion and exclusion criteria. Sociodemographic data and the Pittsburgh Sleep Quality Index (PSQI) were employed to assess SMU and sleep quality at bedtime. Poor sleep quality was indicated by a PSQI global score of >5.

RESULTS: Of the participants, 60% reported using social media, with TikTok being the most frequently used platform (17.4%). The prevalence of poor quality of sleep among participants was 44.2%. Adolescents who used social media for extended hours, particularly in the evening or at night, had significantly higher PSQI scores ($p < 0.001$). A strong association was found between bedtime social media use and poor sleep quality. Among adolescents with poor sleep quality, 88.1% were social media users compared to 11.9% non-users ($p < 0.001$).

CONCLUSION: This study demonstrates a significant association between SMU patterns and adolescent sleep quality. These findings suggest that increased exposure to social media, especially during critical hours preceding sleep, may adversely affect sleep latency, duration, efficiency, and overall sleep quality.

KEYWORDS: Adolescents, Bedtime, PSQI, Sleep Quality, Social Media Use, TikTok

INTRODUCTION

More than 4.8 billion people worldwide used social media in 2023, representing 59.9% of the world's total population, reflecting exponential growth in social media usage (SMU)¹. In January 2024, 71.70 million Pakistanis were active on social media, representing 29.5% of the country's population. Facebook and YouTube remain the most widely used social media platforms, followed closely by WhatsApp and Twitter. Most of the country's internet and social media audience is aged 5 to 17, representing 30% of all social media users².

Social media websites are online platforms where users can interact in various ways. Facebook, Instagram, Snapchat, and Twitter are just a few of these websites, but new ones are constantly being developed³. The child's age, developmental stage, and personality characteristics, along with specific information consumed and how it is perceived, may affect whether benefits are derived from these

websites⁴.

Adolescence is the most vital transition phase in terms of behavior and mental and physical development. Parts of the brain which go through big changes of growth during adolescence may be influenced by excessive SMU⁵. Sleep is crucial for good health, specifically during adolescent physical and mental growth⁶.

There is a significant amount of evidence connecting adolescents' poor health habits, poor school performance, and various physical and mental health conditions to lack of sleep. This effect is particularly evident when individuals actively communicate through digital media, such as social media and social messaging, rather than when they use passive media, such as TV watching⁷.

Adolescents' sleep duration and sleep-related issues have been associated with using several screen media, including social media, watching online news, and using other electronic devices, for over two hours daily. Even with the lights off, it continues and lengthens the time to fall asleep⁸. As per previous findings, shorter sleep duration and delayed bedtime are also linked with SMU among adolescents⁹.

Results of various studies remain inconclusive; some indicated a strong correlation between SMU and sleep-related disorders, whereas others reported no correlation¹⁰. This may be due to variation in measuring SMU. Whereas some studies focus on how much time is spent on social media, others examine the number of sites used, and others investigate problematic SMU^{11,12}.

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As in other regions of the globe, SMU is now a central part of everyone's daily life, including in Pakistan. It is used extensively for various activities, such as e-commerce, learning, and communication¹³.

The current study was designed to assess the impact of social media use on sleep patterns in adolescents in our population. Most of the evidence now available comes from high-income countries, with context-specific limitations, such as environmental and cultural factors that affect sleep in South Asian adolescents. In addition, there is a scarcity of data on Pakistani adolescents' use of social media and its relationship to sleep quality, using validated measures such as the Pittsburgh Sleep Quality Index (PSQI). This research may bridge this critical gap by investigating the impact of SMU on adolescents' sleep patterns.

The study can potentially help in public health awareness, drafting of informed policy & guidelines, early intervention and prevention, parental education & awareness, and support for mental health programs.

METHODOLOGY

This analytical cross-sectional study was conducted at the Armed Forces Institute of Mental Health in Rawalpindi, Pakistan, from March - September 2024. The sample size was calculated using a prevalence of sleep problems of 48.5%¹⁴, at a 95% confidence level and a 5% margin of error. A non-probability, consecutive sampling technique was applied. The Armed Forces Institute of Mental Health, Rawalpindi Ethical Committee, approved the study protocol.

Inclusion criteria

- Adolescents aged 10–19 years
- Both genders
- Adolescents attending the outpatient department as patient attendants during the study period.

Exclusion criteria

- Adolescents with any diagnosed medical illness
- Known history of psychiatric disorders

Written permission was secured from the attendants or guardians of all adolescents before data collection commenced. The committed author of this study evaluated their demographic data, social media profiles, and sleep patterns using a pro forma. Self-reported responses on daily length (average hours per day), platform type, peak usage periods, and interactions within an hour before bedtime were used to gauge social media use. Additionally, participants reported how long they spent on social media before bed and if they routinely utilized it.

Sleep assessment was performed using the PSQI, which comprises 24 items: 19 of which are self-rated, and the remaining 5 (answered by a bed partner or roommate) were excluded from scoring and used for clinical reference. The PSQI was developed by Buysse DJ, Reynolds CF, Monk TH, Berman SR, and Kupfer DJ in 1989 at the University of Pittsburgh. PSQI is a validated and widely used instrument for assessing subjective sleep quality over the past

month^{15,16}. It has been validated across different populations, including adolescents, adults, elderly individuals, and patients with psychiatric or medical conditions¹⁷. The scoring is based on seven components:

1. subjective sleep quality
2. sleep latency
3. sleep duration
4. habitual sleep efficiency
5. sleep disturbances
6. use of sleep medication, and
7. daytime dysfunction.

Each component is scored from 0 to 3, yielding a total score ranging from 0 to 21. A score >5 indicates poor sleep quality, while a score ≤5 indicates good sleep¹⁸. Higher scores reflect poorer sleep. This tool is also reliable and validated in Urdu¹⁹. Data was presented as mean ± S.D for quantitative data, while categorical data was presented as frequency (%). The Chi-square test was applied to assess associations between social media use and sleep quality. Data were analyzed using SPSS version 24, and p-values ≤ 0.05 were considered significant.

RESULTS

A total of 380 adolescents participated in the study. The mean age of participants was 14.36±2.84 years. The majority were male (n = 206, 54.2%), and females comprised 45.8% (n = 174) of the sample. A significant proportion of adolescents (n = 228, 60.0%) reported using social media, while 40.0% (n = 152) indicated no usage. In terms of daily usage duration, 40.0% (n = 152) did not use social media at all, whereas among users, 17.1% (n = 65) used it for less than 1 hour, 14.2% (n = 54) for 1–2 hours, 15.3% (n = 58) for 2–4 hours, and 13.4% (n = 51) used it for more than 4 hours daily. TikTok was the most commonly used platform (n = 66, 17.4%). The most common time for social media usage was the afternoon (n = 91, 23.9%), followed by the evening (n = 57, 15.0%). A large majority (325, 85.5%) did not use social media before bed; however, 14.5% (n = 55) did. Regarding time spent on social media in the hour before sleep, 85.5% (n = 325) reported no use, while 3.7% (n = 14) used it for less than 30 minutes, 5.8% (n = 22) for 30 minutes to 1 hour, 2.9% (n = 11) for 1–2 hours, and 2.1% (n = 8) for more than 2 hours. **Table I**

The mean global PSQI score was 6.60 ± 4.06. Based on the standard PSQI cutoff (>5), 44.2% (n = 168) of participants were classified as having poor sleep quality, while 55.8% (n = 212) had good sleep quality. In terms of subjective sleep quality, 45.3% (n = 172) rated their sleep as very good, 19.7% (n = 75) as fairly good, 18.9% (n = 72) as fairly bad, and 16.1% (n = 61) as very bad. Regarding sleep latency, 24.5% (n = 93) fell asleep within 15 minutes, while the majority (39.2%, n = 149) reported a latency of 31–60 minutes, followed by 16–30 minutes in 20.0% (n = 76), and >60 minutes in 16.3% (n = 62). Sleep duration was more favorable, with over half (50.8%, n = 193) sleeping

more than 7 hours, though 21.6% (n = 82) reported 6–7 hours, 12.6% (n=48) had 5–6 hours, and 15.0% (n=57) slept less than 5 hours. More than half (54.7%, n=208) had sleep efficiency >85%, with 30.0% (n=114) between 75–84% and 15.3% (n=58) between 65–74%. Sleep disturbances were frequent: 54.7% (n=208) experienced them once or twice a week, 26.8% (n=102) less than once a week, and only 18.4% (n=70) reported none during the past month. The majority (94.5%, n=359) did not use sleep medication, whereas a small proportion used it once or twice (0.8%, n=3) or three or more times per week (4.7%, n=18). Daytime dysfunction due to poor sleep was reported by 29.2% (n=111) once or twice a week, 28.7% (n=109) less than once a week, and 5.0% (n=19) three or more times a week. **Table II, Figure 1**

A statistically significant association was observed between social media use and sleep quality ($p < 0.001$). Among adolescents with poor sleep quality, 88.1% (n=148) reported using social media compared to 37.7% (n=80) among those with good sleep quality. Duration of social media use was also significantly associated with sleep quality ($p < 0.001$). Higher proportions of poor sleep were observed among adolescents reporting longer daily usage durations. Similarly, the time of social media use demonstrated a significant association with sleep quality ($p < 0.001$), with evening and nighttime users showing higher proportions of poor sleep.

Use of social media before bedtime was significantly associated with sleep quality ($p = 0.001$). Additionally, the duration of social media use during the hour preceding sleep was significantly related to sleep quality ($p = 0.029$) (**Table II**).

Table I: Sociodemographic and social media profile of adolescents (n=380)

Sociodemographic and social media profile	Mean $\pm$ S.D	Minimum - Maximum	
Age (years)	14.36 $\pm$ 2.84	10 – 19	
Global PSQI Score	6.60 $\pm$ 4.06	0 – 15	
	Category	Frequency	Percent %
Gender	Male	206	54.2
	Female	174	45.8
Do you use social media	No	152	40.0
	Yes	228	60.0
On average, how many hours a day do you use social media?	Don't use	152	40.0
	< 1 hour	65	17.1
	1-2 hours	54	14.2
	2-4 hours	58	15.3
	> 4 hours	51	13.4
What social platforms do you use?	No	152	40.0
	Facebook	33	8.7
	Instagram	30	7.9
	Twitter	32	8.4
	TikTok	66	17.4
	Snapchat	36	9.5

When do you spend the most time on social media?	YouTube	14	3.7
	Others	17	4.5
	None	152	40.0
	Morning	25	6.6
	Afternoon	91	23.9
Do you check social media right before bed?	Evening	57	15.0
	Night (after 9 pm)	55	14.5
In the hour before bed, how much time do you typically spend on social media?	No	325	85.5
	Yes	55	14.5
	Don't use before bed	325	85.5
	Less than 30 minutes	14	3.7
	30 minutes to 1 hour	22	5.8
	1-2 hours	11	2.9
	More than 2 hours	8	2.1

Table II: Comparison of sleep quality with social media usage and its type

Variable	Category	Poor Quality Sleep	Good Quality Sleep	p-value
Do you use social media?	No	20 (11.9%)	132 (62.3%)	<0.001
	Yes	148 (88.1%)	80 (37.7%)	
How many hours per day do you spend on social media (on average)?	Don't use	20 (11.9%)	132 (62.3%)	<0.001
	< 1 hour	40 (23.8%)	25 (11.8%)	
	1-2 hours	40 (23.8%)	14 (6.6%)	
	2-4 hours	41 (24.4%)	17 (8.0%)	
	> 4 hours	27 (16.1%)	24 (11.3%)	
Which social media do you use?	No	20 (11.9%)	132 (62.3%)	<0.001
	Facebook	25 (14.9%)	8 (3.8%)	
	Instagram	22 (13.1%)	8 (3.8%)	
	Twitter	21 (12.5%)	11 (5.2%)	
	TikTok	39 (23.2%)	27 (12.7%)	
	Snapchat	20 (11.9%)	16 (7.5%)	
	YouTube	13 (7.7%)	1 (0.5%)	
	Others	8 (4.8%)	9 (4.2%)	
What time of day do you mostly use social media?	None	20 (11.9%)	132 (62.3%)	<0.001
	Morning	19 (11.3%)	6 (2.8%)	
	Afternoon	58 (34.5%)	33 (15.6%)	
	Evening	36 (21.4%)	21 (9.9%)	
	Night (after 9 pm)	35 (20.8%)	20 (9.4%)	
Do you use social media before going to bed?	No	133 (79.2%)	192 (90.6%)	0.001
	Yes	35 (20.8%)	20 (9.4%)	
On average, how much time do you spend on social media in the hour before you sleep?	Don't use before bed	133 (79.2%)	192 (90.6%)	0.029
	Less than 30 minutes	9 (5.4%)	5 (2.4%)	
	30 minutes to 1 hour	14 (8.3%)	8 (3.8%)	
	1-2 hours	8 (4.8%)	3 (1.4%)	
	More than 2 hours	4 (2.4%)	4 (1.9%)	

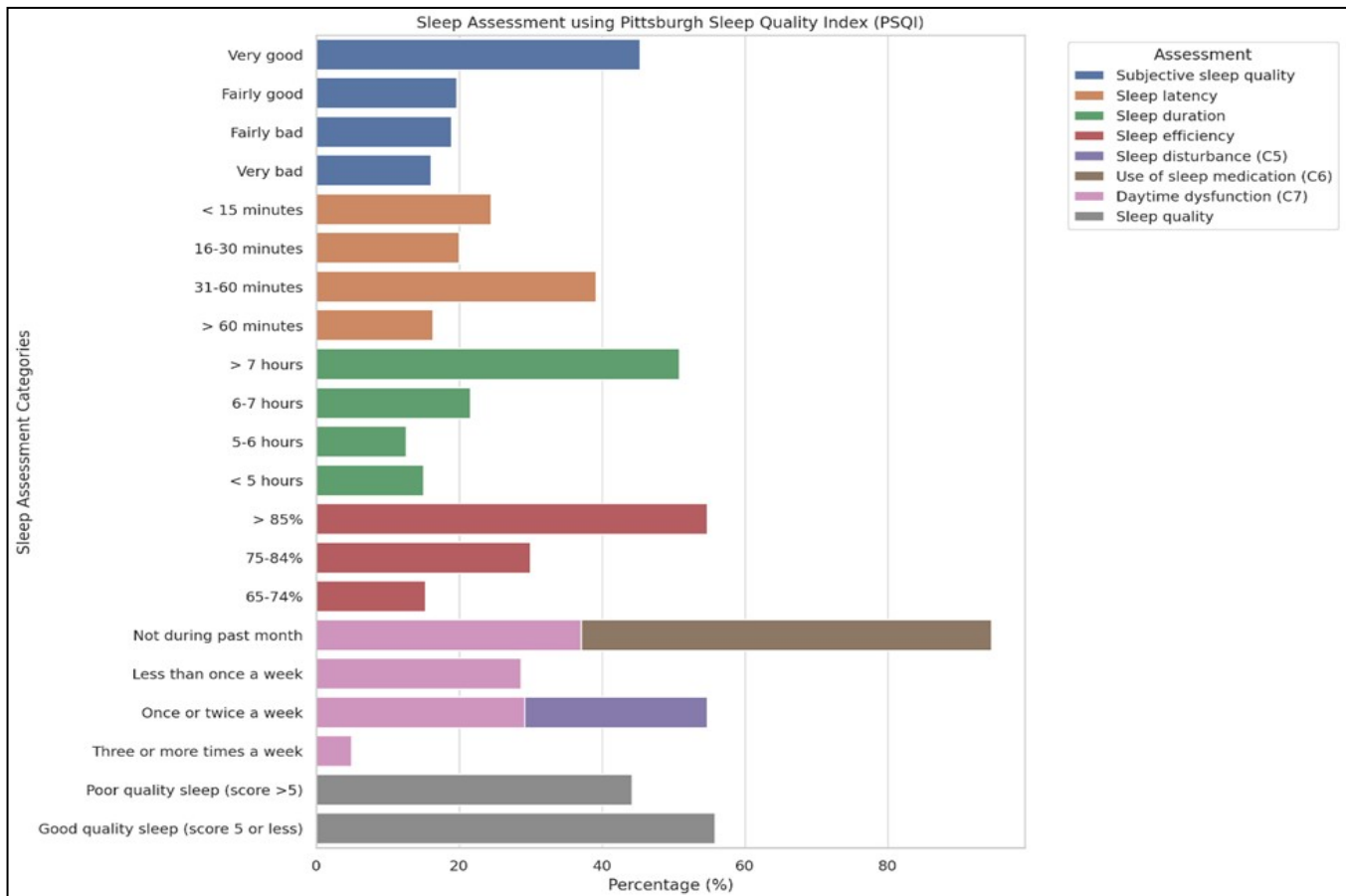


Figure I: Sleep assessment using the Pittsburgh Sleep Quality Index (PSQI) (n=380)

DISCUSSION

Adolescence is a period of growth and development, and adequate sleep is required for optimal physical, mental, and emotional well-being. However, based on existing studies of Pakistani young adults, nearly 90% of them utilize social media, which provokes queries about the influence of social media utilization on sleep health²⁰. Excessive or inappropriately timed SMU has been cited in various studies as one of the causes of sleep disturbances, including delayed onset of sleep, reduced sleep interval, and decline in overall sleep quality²¹.

This study provides significant insights into SMU and its impact on adolescent sleep patterns. Participants' mean age was 14.36 years, and there was a male predominance. These findings are consistent with those of the early to mid-adolescent group, which is known to be quite engaged on digital platforms. Interestingly, 60% of the adolescents in this study reported using social media, which corroborates other findings that children use technology extensively²².

One of the primary findings of our study is the association between SMU and sleep quality. Based on PSQI scores, 44.2% of the participants reported poor sleep quality, consistent with previous research. Based on recent studies in Brunei and Saudi Arabia,

PSQI scores of 52% and 34.7%, respectively, were labelled as poor sleepers^{23,24}. The differences in the percentages (34.7%, 44.2%, and 52%) indicate that factors related to the environment or circumstances (e.g., lifestyle, social standing, cultural traditions) can affect adolescents' sleep quality.

In our study, 14.5% of participants used social media before bedtime, and a significantly higher proportion reported poor sleep quality. For instance, 88.1% of those with poor sleep quality used social media, compared with only 11.9% of those without ($p < 0.001$). Adolescents who use social media for longer periods, particularly over 4 hours a day, are more likely to report poor sleep quality, with 16.1% experiencing poor sleep quality compared to 11.3% with good sleep quality.

These findings are supported by a large-scale Hong Kong study of 3,455 adolescents, which similarly concluded that excessive electronic media use (EMU), particularly for over 2 hours per day or within 1 hour before bedtime, was significantly associated with poor mental health, sleep problems, behavioral, social, and emotional problems ($p < 0.05$). EMU and these difficulties were found to be mediated by sleeping problems, such as social jet lag, insomnia, and sleep deprivation⁵.

The same effects were observed by Kortesoja et al.²⁵

who concluded that pre-sleep SMU correlated with shorter sleep duration, more poor-quality sleep, and daytime drowsiness. Additionally, late-night SMU strengthened the link between screen-based stimulation and sleep delay by mediating the relationship between diurnal type and sleep quality. Similarly, a descriptive survey of 150 adolescents indicated a small but substantial association between bedtime SMU and sleep quality ($r = 0.262$, $p = 0.001$). The study also highlighted strong correlations between sleep quality and variables such as academic grade, bedtime routine, weekly sleep duration, and bedtime SMU²⁶.

An extensive multinational study analyzing data from over 212,000 adolescents across 40 countries adds further weight to our results. This research found that sleep-onset problems were significantly associated with intensive and problematic SMU, with problematic use showing higher correlations (OR: 2.20 in girls, OR: 1.88 in boys). These findings indicate the importance of assessing screen time, usage habits, and compulsivity, particularly at night²⁷. Another study in Northern Italy, with over 3,100 children aged 11-15, further reinforces the findings and concluded that more than one in three students (34.3%) had trouble falling asleep²⁸.

Among the platforms used, TikTok was the most common (17.4%), followed by Snapchat, Facebook, and others. These findings mirror the previous conclusions of a cross-sectional study conducted in the Aseer region of Saudi Arabia, which involved 961 public secondary school students. In that study, prolonged use of social media—particularly TikTok (OR: 1.33, 95% CI: 1.01–1.77) and the number of hours spent on social media daily (OR: 1.26, 95% CI: 1.16–1.37) were significant predictors of poor sleep quality. The relevance of this association lies in TikTok's short, engaging videos and algorithm-driven content, which can lead to extended screen time, especially at night, thereby disrupting sleep patterns²⁴. These findings support our research's results that individuals who spent more time on social media, especially in the evening or late at night, and those who used TikTok most frequently had much higher sleep disturbance and poor quality sleep.

Moreover, our study found that while most adolescents slept for over 7 hours, a notable proportion (15%) reported sleeping for less than 5 hours, which is below the suggested level. Our findings are supported by a cross-sectional study of 576 Iranian high school students, which demonstrates a statistically significant relationship between teenage social media use and poor sleep quality ($P = 0.02$). According to the study findings, over 62% of participants left their phones on while sleeping, and the mean daily screen time was 7.5 ± 4.4 hours. Also, a strong association existed between SMU and depressive symptoms (Spearman's $\rho = 0.171$; $P < 0.001$), yet an inverse correlation existed between the duration of sleep and electronic device usage

(Spearman's $\rho = -0.17$; $P = 0.03$)²². The present study's results align with the above findings since the increased duration of social media use was associated with increased daytime dysfunction, poorer quality of sleep, and longer sleep latency.

This study highlights the negative impact of excessive and poorly timed SMU on adolescent sleep health. However, its cross-sectional design, reliance on self-reported data, limited geographic scope, and lack of objective sleep measures or control for confounding variables limit causal inferences. Still, the findings underscore the need for targeted interventions promoting digital hygiene and healthy sleep habits among teenagers.

CONCLUSION

This study demonstrates a significant association between SMU patterns and sleep quality among adolescents. A substantial proportion (44.2%) of the adolescents reported poor sleep quality, as measured by the PSQI. Social media usage was prevalent, with 60.0% of participants engaging on these platforms. Adolescents who used social media—particularly for longer durations, during nighttime hours, and immediately before bedtime—were significantly more likely to experience poor sleep quality ($p < 0.001$). These findings suggest that increased exposure to social media, especially during critical hours preceding sleep, may adversely affect sleep latency, duration, efficiency, and overall sleep quality. Interventions promoting responsible social media use, especially by limiting screen time before bedtime, may improve sleep health among adolescents.

Ethical permission: Armed Forces Institute of Mental Health, Rawalpindi, Pakistan, ERC letter No. ERC/2503.

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AUTHOR CONTRIBUTION

Muhammad S: Idea conception, study designing, data collection, results and interpretation, manuscript writing and proof reading

Iqbal H: Idea conception, study designing, data collection, results and interpretation, manuscript writing.

Ullah A: Literature search, data collection, results and interpretation

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Hidayat N: Literature search, data collection, results and interpretation

Waseem A: Literature search, data collection, results and interpretation questionnaire design.

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